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MINERAL INDUSTRY SURVEYS

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PRECIOUS METALS IN APRIL 1997

U.S. mines produced 26,400 kilograms of gold and 127,000 kilograms of silver in April 1997. Gold production in California was essentially unchanged from the previous month. Production in Nevada, the largest gold producer, was down by about 8%. Production of silver was essentially unchanged. A 6% decrease in production of silver in Nevada was mostly offset by a 22% increase in California and a 10% increase in the "other" category.

Gold

Russia to Set Up Gold Commission.—The Russian Government has decided to create a government commission on precious metals to reorganize the administration of precious metals and deregulate the country's gold trade. Membership of the new commission will be composed of the heads of the ministries of industry, natural resources, the central bank, the state customs committee, the state antimonopoly committee (Gokhran), and other concerned ministries and bodies of authority. When the new commission is created, it will be enjoined to ensure payment for gold delivered to state refineries by mining companies within 5 days of the date of delivery. If there is a payment default or if the Gokhran is unable to assure payment, the mining companies will be authorized to sell gold to domestic banks or export the gold. A provision to this effect was authorized for the Cyprus Metals-Amax Omolon gold-mining project in Magadan. It is now expected to be extended and become applicable throughout the industry. The draft charter of the new body includes a statement that it will carry out a unified policy of state regulations in the production sector and provide preliminary yearly plans for the purchase of precious metals (Platt's Metals Week 1997b).

High-Strength Gold Alloy Developed.—A 24-carat gold alloy that is seven times harder than its conventional counterpart has reportedly been developed in Japan. Designated High-Strength Pure Gold, the 99.9% gold alloy is still considered to be 24-carat. To impart the improved properties, microscopic amounts of alloying elements are added. At this point, the alloy is three times harder than conventional 24-carat gold. It is then heat treated at a temperature of 350 °C for 30 minutes, which increases hardness up to seven times that of the conventional alloy. Currently, the material is produced in wire, sheet, and rod (Advanced Materials & Processes, 1997a).

Silver

Sunshine Mine Increases Silver Output.—Silver production at the Sunshine Mine in Idaho rose to 901,000 troy ounces in the first quarter 1997, two-thirds more than the 554,000 ounces produced in first quarter of 1996. The mine returned to full production in the first quarter of this year. The first quarter output was the highest for any quarter since June 1991. The increased output was due to the development of the West Chance section of the mine. According to Sunshine Mining & Refining, owner of the mine, total production for 1997 should exceed 4 million ounces and by third quarter the mine should be producing at the rate of 5 million ounces per year. West Chance, discovered in 1992, will provide nearly all the mine's silver production in 1997. It will also increase Sunshine Mining & Refining's total silver reserves to 35 million ounces, with 13 million ounces coming from West Chance (Platt's Metals Week, 1997c).

Silver Selected For Use in Superconductor.—Trials of a 200-horsepower electric motor and a 50-meter superconducting transmission line using high-strength, high-temperature superconducor wire, have been successfully completed. The wire is made by first drawing down silver tubes packed with superconducting oxides to diameters of a fraction of a millimeter, then bundling dozens of the tubes together. The bundles are crushed into tape that is flexible, strong, and

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superconducting. Silver was selected as the jacketing material because it does not react with oxides. As a result, it can be mixed with oxides to form a highly conductive "cement" between particles. This is beneficial because studies have shown that the greatest amount of current flows in the superconducting oxides where they touch the silver. The crystal structure of silver is also important in the manufacture of the superconducting material, which is a combination of oxides of copper, barium, and rare earths. At the temperature the metals are oxidized, the silver jacket allows oxygen to be pumped into the metals, converting them into superconducting oxides. Then, when the wires are cooled to the -196 °C operating temperature, the silver blocks the loss of oxygen (Advanced Materials and Processes, 1997b).

High-Performance Silver Recovery Apparatus.—An apparatus at Kennedy Space Center recovers silver from liquid waste produced during the development of photographic and radiographic film. According to the inventors, this apparatus recovers a greater portion of silver from the waste stream than with previously available silver-recovery equipment. In this apparatus, dissolved silver is removed from the waste stream by exchanging silver ions for iron ions in sacrificial cartridges in treatment cells, while particulate silver is removed by filtering. The system includes several treatment cells in series; a "lead" (farthest upstream) cell followed by a "lag" cell followed by a tailing or "polishing" stage that comprises a duel cell plus a single cell. When the concentration of silver in the lead-cell cartridge reaches the maximum allowable, this cartridge is removed to harvest the silver, the cartridge from the lag cell is moved to the lead position, and a fresh cartridge is placed in the lag cell. The apparatus treats as much as 15 gallons (about 166 liters) of waste per day, recovering more than 99.9% of the silver. The concentration of silver in the effluent is no more than 5 parts per million, low enough to be sent to a sewage treatment plant (NASA Tech Briefs, 1997).

Platinum-Group Metals

Officials at South African platinum-group-metal producer Amplats announced plans to increase its platinum production capacity from the existing 1.8 million ounces per annum to 1.84 million ounces by early 1999 and to 2.1 million oz in 2002. The company's Potgietersrust Platinum Division said it will expand its concentrator capacity from 250,000 tons of ore per month to 375,000 tons per month, which will add another 40,000 ounces to its output by 1999. Amplats also announced plans to develop a new mine, Boschkoppies, which it expects to produce 250,000 ounces of platinum at full production in 2002. At the same time, Anglo American Platinum plans to merge its four listed companies (Amplats, Rustenburg, Lebowa, and Potgietersrust) into one, Amplats.

Meanwhile, production of platinum at the Northern Platinum mine was down for first quarter 1997. Northern produced 77,665 ounces of PGM in concentrates during first quarter 1997 compared with 85,818 ounces in the previous quarter (Platt's Metals Week 1997a).

Update: Defense Logistics Agency to Upgrade Platinum

Fort Belvoir, VA, May 30, 1997—The Defense National Stockpile Center (DNSC) issued an Information to Offerors or Quoters to provide materials and services necessary for the upgrading of 2,565.61 fine troy ounces of Government-owned platinum and 2,225.26 fine troy ounces of palladium located at Somerville, NJ. Bids are due on June 30, 1997, at 2:00 p.m., local time at the Defense National Stockpile Center, 8725 John J. Kingman Road, Suite 4616 (Mail) or Suite 4528 (Hand Delivery), Fort Belvoir, VA. Request for copies of the invitation and other inquiries should be directed to Phyllis Shockley, (703) 767-5482.

References Cited

Advanced Materials & Processes, 1997a, Gold alloy is 7 times harder, yet easy to weld and machine: Advanced Materials & Processes, v. 151, no.6, June, p. 7.

———1997b, Silver selected to jacket high-strength superconductor: Advanced Materials & Processing, April, p. 8.

NASA Tech Briefs, 1997, High-performance silver-recovery apparatus: NASA Tech Briefs, v. 21, no. 4, April, p. 59.

Platt's Metals Week, 1997a, Amplats to increase platinum output: Platt's Metals Week, v. 68, no. 16, April 21, p. 6.

———1997b, Russia to set up new gold commission: Platt's Metals Week, v. 68, no. 14, April 7, p. 3.

———1997c, Silver production up at Sunshine Mine: Platt's Metals Week, v. 68, no. 16, April 21, p. 4.

Publications on the Internet

Monthly, quarterly, and annual Minerals Information publications are now available through the World Wide Web (www). These publications include Mineral Commodity Summaries, Minerals Yearbook, Mineral Industry Surveys, and Metal Industry Indicators. To access Minerals Information publications, visit the Minerals Information home page at http://minerals.er.usgs.gov/minerals.

TABLE 1
MINE PRODUCTION OF RECOVERABLE GOLD AND SILVER IN THE UNITED STATES, BY STATE 1/

(Kilograms)

	Arizona	California	Montana	Nevada	Other States 2/	Total
Gold:						
1996: p/						
April	161	2,250	968	16,400	5,040	24,800
May	168	2,170	959	18,100	4,860	26,300
June	117	2,210	703	17,500	4,960	25,500
July	119	2,080	987	19,000	4,990	27,200
August	158	1,880	1,010	19,300	5,250	27,600
September	232	1,920	968	18,500	5,580	27,200
October	223	1,920	1,140	19,100	5,320	27,700
November	125	1,860	929	18,000	4,810	25,700
December	124	1,980	876	19,800	5,240	28,000
Jan.-Dec.	2,070	24,500	10,800	215,000	60,900	313,000
1997:						
January	W	1,840	733 r/	18,200 r/	5,270 r/	26,100 r/
February	W	1,840	754 r/	16,100 r/	5,110 r/	23,800 r/
March r/	W	1,890	767	20,000	5,350	28,000
April	W	1,890	714	18,500	5,310	26,400
Jan.-Apr.	W	7,450	2,970	72,800	21,000	104,000
	Arizona	California	Idaho	Nevada	Other States 3/	Total
Silver:						
1996: p/						
April	14,700	W	11,300	39,800	40,100	106,000
May	15,200	1,990	16,700	49,400	34,500	118,000
June	12,100	1,570	16,300	57,700	39,800	127,000
July	13,700	1,990	18,300	55,300	38,400	128,000
August	13,600	1,470	17,900	53,900	45,800	133,000
September	13,000	1,330	17,000	57,200	37,500	126,000
October	12,500	1,450	17,200	67,700	35,800	135,000
November	13,900	1,340	16,300	48,900	32,200	113,000
December	14,100	1,250	17,200	58,300	34,800	126,000
Jan.-Dec.	167,000	16,800	194,000	617,000	441,000	1,440,000
1997:						
January	11,200	1,120	18,200 r/	64,600	35,200 r/	130,000
February	10,300 r/	1,090	17,400 r/	46,200	36,400 r/	111,000 r/
March	14,700 r/	1,370 r/	18,000 r/	61,700 r/	33,700	130,000 r/
April	12,000	1,670	18,100	58,100	36,900	127,000
Jan.-Apr.	48,200	5,260	71,800	231,000	142,000	498,000

p/ Preliminary. r/ Revised. W Withheld to avoid disclosing company proprietary data; included with "Other States."

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes Alaska, Colorado, Idaho, New Mexico, South Carolina, South Dakota, Utah, Wisconsin, and State indicated by symbol "W."

3/ Includes Alaska, Colorado, Michigan, Missouri, Montana, New Mexico, New York, South Carolina, South Dakota, Utah, Wisconsin, and State indicated by symbol "W."

TABLE 2
SELECTED PRECIOUS METAL PRICES

(Dollars per troy ounce)

	Gold	Silver	Platinum	Palladium
Engelhard Industries:				
1996:				
Year:				
Low/date	368.67 (Dec. 03)	4.67 (Dec. 03)	368.00 (Dec. 16)	117.00
High/date	391.06 (Aug. 05)	5.82 (Feb. 02)	433.00 (Feb. 05)	146.00
Average	389.17	5.20	397.97	130.39
1997:				
March:				
Low/date	347.29/26	5.04/31	371.00/31	145.00
High/date	363.42/03	5.30/14	391.00/03	163.00
Average	352.42	5.03	368.70	139.55
April:				
Low/date	340.47/29	5.02/02	383.00/21	150.00
High/date	352.30/02	4.70/15	364.00/08	164.00
Average	350.73	4.96	369.61	143.73
May:				
Low/date	340.48/01	4.67/22	372.00/01	158.00
High/date	350.34/14	4.90/12	415.10/29	200.00
Average	345.00	4.76	390.14	173.38
Year to date:				
Low/date	338.92 (Feb. 12)	4.65 (Jan. 08)	350.00 (Feb. 03)	122.00
High/date	367.82 (Jan. 01)	5.30 (Mar. 14)	415.10 (May 29)	200.00
Average	349.59	4.92	373.71	149.66
Handy and Harman:				
1996:				
Average	387.81	5.18	XX	XX
1997:				
March	351.67	5.19	XX	XX
April	344.47	4.77	XX	XX
May	343.75	4.75	XX	XX
Year to date	348.34	4.91	XX	XX
London Final:				
1996:				
Average	387.70	5.20	XX	XX
1997:				XX
March	351.80	5.21	XX	XX
April	344.47	4.77	XX	XX
May	343.84	4.75	XX	XX
Year to date	348.49	4.91	XX	XX

XX Not applicable.

Source: Platt's Metals Week.

TABLE 3
U.S. IMPORTS AND EXPORTS OF GOLD, BY COUNTRY 1/

(Kilograms of gold content, unless otherwise specified)

Country	Ores and concentrates 2/	Dore and precipitates	Refined bullion 3/	Total	Waste and scrap 4/ (gross weight)
Imports for consumption:					
1996:					
Year	3,460	11,900	143,000	159,000	13,000
1997:					
January	309	785	12,500	13,600	1,020
February	243	1,810	12,700	14,700	658
March:					
Belgium	--	--	1,090	1,090	--
Brazil	--	--	3,040	3,040	--
Canada	--	746	19,200	20,000	94
Chile	--	1	463	464	2
Colombia	--	--	821	821	--
Dominican Republic	--	--	41	41	265
Mexico	121	885	67	1,070	165
Netherlands Antilles	--	--	285	285	--
Peru	--	--	657	657	10
Switzerland	--	--	739	739	--
Other	--	--	523	523	378
Total	121	1,630	27,000	28,700	914
Year to date	673	4,230	52,100	57,000	2,600
Exports:					
1996:					
Year	374	65,100	406,000	471,000	89,900
1997:					
January	4	4,840	9,380	14,200	4,760
February	97	3,950	23,200	27,300	3,880
March:					
Canada	18	546	11,000	11,500	2,720
France	--	--	--	--	1,330
Germany	56	--	514	570	175
Hong Kong	--	--	1,010	1,010	--
Korea, Republic of	--	--	10	10	--
Mexico	--	--	295	295	--
Switzerland	--	3,270	44,900	48,200	--
Taiwan	--	--	1,000	1,000	--
United Kingdom	--	2,360	23,800	26,100	1,050
Other	--	--	194	194	233
Total	74	6,180	82,700	88,900	5,510
Year to date	175	15,000	115,000	130,000	14,200

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes gold content of base metal ores, concentrates, and matte imported for refining.
3/ Bullion also moves in both directions between U.S. markets and foreign stocks on deposit in the Federal Reserve Bank. Monetary gold excluded.
4/ "Waste and scrap" not included in "Total."

Source: Bureau of the Census.

TABLE 4
U.S. IMPORTS AND EXPORTS OF SILVER, BY COUNTRY 1/

(Kilograms of silver content, unless otherwise specified)

Country	Ores and concentrates 2/	Dore and precipitates	Refined bullion	Total	Waste and scrap 3/ (gross weight)
Imports for consumption:					
1996:					
Year	153,000	281,000	2,580,000	3,010,000	1,780,000
1997:					
January	2,140	34,400	205,000	241,000	113,000
February	12,800	25,500	143,000	181,000	101,000
March:					
Canada	--	10,300	98,200	109,000	23,800
Chile	--	13,600	1,750	15,400	898
Dominican Republic	--	246	--	246	187
Germany	--	--	--	--	85
Hong Kong	--	--	--	--	56,800
Malaysia	--	--	--	--	19,300
Mexico	8,220	965	44,500	53,700	--
Peru	--	--	18,100	18,100	--
Philippines	--	--	16	16	13,000
United Kingdom	--	--	--	--	21,300
Other	--	96	--	96	257
Total	8,220	25,200	163,000	196,000	136,000
Year to date	23,200	85,100	510,000	618,000	349,000
Exports:					
1996:					
Year	1,510	43,300	2,900,000 4/	2,950,000	1,280,000
1997:					
January	80	5,280	52,900	58,200	70,800
February	11,600	9,380	41,400	62,400	87,000
March:					
Belgium	--	--	--	--	7,810
Brazil	--	147	--	147	67
Canada	--	--	--	--	27,200
China	--	109	--	109	8,300
France	--	--	--	--	933
Germany	--	--	--	--	2,140
Italy	--	--	--	--	78
Japan	--	293	--	293	35,700
Sweden	--	--	--	--	2,440
Switzerland	--	495	--	495	--
Taiwan	--	7,500	--	7,500	219
United Kingdom	--	967	--	967	6,810
Other	--	--	80	80	571
Total	--	9,510	80	9,590	92,300
Year to date	11,700	24,200	94,300	130,000	250,000

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes silver content of base metal ores, concentrates, and matte imported for refining.
3/ "Waste and scrap" not included in "Total."
4/ Verification of Bureau of the Census exports was not possible for some months of 1996.

Source: Bureau of the Census.

TABLE 5
U.S. IMPORTS AND EXPORTS OF PLATINUM-GROUP METALS, BY COUNTRY 1/

(Kilograms of metal content, unless otherwise specified)

Country	Ores and concentrates	Waste and scrap (gross weight)	Refined					
			Platinum	Palladium	Rhodium	Iridium	Osmium	Ruthenium
Imports for consumption:								
1996:								
Year	1,960	5,060	73,700 2/	146,000	9,650	1,810	329	15,600
1997:								
January	--	181	6,480	7,420	808	271	--	1,670
February	--	314	7,210	11,500	1,200	188	--	899
March:								
Belgium	--	--	170	962	4	--	--	--
Canada	--	5	140	258	--	--	--	--
China	--	--	--	333	--	--	--	--
France	--	88	--	--	--	--	--	--
Germany	--	--	357	560	10	5	--	--
India	--	59	--	--	--	--	--	--
Japan	--	--	--	849	--	--	--	--
Mexico	--	53	--	--	--	--	--	--
Norway	--	--	--	220	3	--	--	--
Russia	--	--	14	832	--	--	--	31
South Africa	--	--	2,510	1,190	374	27	--	967
Switzerland	--	--	430	1,220	50	--	--	--
United Kingdom	--	--	1,030	130	6	4	--	6
Other	--	121	5	--	--	--	--	--
Total	--	326	4,660	6,560	447	36	--	1,000
Year to date	--	821 3/	18,300	25,500	2,460	495 3/	--	3,570
Exports:								
1996:								
Year	484	8,640	12,700	26,700	196	123 4/		
1997:								
January	116	990	915	2,720	1	27 4/		
February	63	554	529	2,920	7	5 4/		
March:								
Belgium	--	245	499	400	--	--		
Canada	--	11	368	79	--	2 4/		
France	--	1	22	412	--	--		
Germany	--	88	55	193	1	--		
Hong Kong	--	--	--	75	--	--		
Ireland	--	--	6	--	--	--		
Japan	35	115	352	597	1	5 4/		
Korea, Republic of	--	--	37	266	3	--		
Mexico	--	--	9	327	--	--		
Netherlands	--	--	8	199	--	--		
South Africa	--	--	--	301	--	--		
Switzerland	25	--	273	96	--	--		
Taiwan	--	--	8	441	--	--		
United Kingdom	--	653	109	175	--	--		
Other	--	9	208	405	--	2 4/		
Total	60	1,120	1,950	3,970	5	9 4/		
Year to date	239	2,670	3,400	9,610	13	41 4/		

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Of this amount, 2,070 kilograms was in the form of platinum coins.
3/ Figure erroneously published in the March issue.
4/ Includes osmium and ruthenium.

Source: Bureau of the Census.